Factors Influencing Participation in Technology Education Graduate Studies

By George E. Rogers and Phillip L. Cardon

Higher education has initiated a variety of educational reforms in an attempt to improve the effectiveness of teacher education over the last two decades. A major focus of the reform movement has been professionalization of schools that prepare educators. Metcalf-Turner and Fischetti (1996) indicated that traditional university approaches to teacher education were inadequate primarily because of disengagement between theory and practice. The need for context-rich educational experiences in teacher preparation is important in all teacher education, but is imperative in the field of technology education. Technology education demands a co-mingling of theory and principles with practice. Morris, Armstrong, and Price (1997) stated that the present teacher education system fails to equip preservice teachers for the realities of the classrooms they will enter. The challenge for technology teacher educators is to embrace reform initiatives that bridge pedagogy by encouraging the profession's best teachers to enter the teacher education faculty ranks, thus keeping technology teacher education theory current with classroom practice.

A key component of this educational reform is technology teacher education faculty versed in both practice and theory. To assist in facilitating these changes, Brown (2002) noted that 64% of the technology teacher education programs surveyed indicated that they would increase their faculty by one or more positions over the next five years. However, Brown also indicated that the field would be short an average of 25 qualified faculty candidates per year and that these positions could go unfilled. Without qualified technology teacher education faculty, it will be very difficult for these education reform efforts to succeed.

Graduate-level technology teacher education has not kept pace with the need for qualified faculty. The number of individuals pursuing graduate studies in technology education, focusing on teacher education, is at its lowest level in five decades (Bell, 2001; Buffer, 1979; Erekson & McAlister, 1988). According to Brown (2002), the technology teacher education profession is in short supply of qualified faculty. Hill (2003) further noted that a shrinking pool of faculty is compromising leadership for the profession. Based on these trends, Volk (1997) predicted that "the demise of technology teacher preparation programs will occur around the year 2005" (p. 69).

Statement of the Problem

Since 1975, there has been a steady decrease in the number of technology teacher education graduates (Volk, 1997). This decrease has been compounded by a significant increase in the number of technology education teachers needed across the nation (Weston, 1997). A survey of technology education leaders rated insufficient quantities of technology education teachers and the elimination of technology teacher education programs at the university level as two of the most critical issues facing the profession (Wicklein, 1993).

Volk (1997) noted that one factor in the decline of university technology teacher education programs has been the lack of graduate-level prepared faculty to serve as technology teacher education professors. Buffer (1979) found that between 1955 and 1977 over 2,500 individuals received a doctoral degree with emphasis in industrial education, the predecessor of technology education. A survey of the *Industrial Teacher Education Directory* (Dennis, 1995, 1996; Bell, 1997, 1998, 1999, 2000) noted there were only 127 technology education doctoral degrees awarded between 1994 and 1999. Buffer (1979) further noted that there were 2,507 master's degrees awarded during the 1976-1977 academic year. This number pales in comparison to the 6,700 master's degrees awarded in 1938 (Buffer, 1979). Furthermore, an examination of the *Industrial Teacher Education Directory* indicated that only 209 master's degrees in technology education were earned in 1999.

Currently, there is a lack of information as to the causes in the decline in technology educators pursuing an advanced degree. Without increasing the number of graduate degrees in technology teacher education, the baccalaureate degree major of technology education may vanish and, consequently, technology education courses will no longer be provided to the nation's middle school and high school students. This research was an attempt to address one of the major problems facing the technology education profession: the lack of graduate prepared teacher education faculty.

Significance of the Problem

According to the International Technology Education Association (2000), technology education teachers prepare the nation's middle school and high school students with core technological knowledge and skills. Secondary technology education is a hands-on program of study that provides an opportunity for students to learn about communication, construction, design, manufacturing, power-energy, and transportation. Technological literacy benefits students from all fields, but especially those who choose technical careers, such as engineering, architecture, industrial design, manufacturing, and construction. Theoretically, a shortage of secondary technology education teachers could have an impact on the quality and quantity of students entering university engineering and technology programs.

The number of technology teacher education graduates from the nation's universities has reached a critical stage. As Volk (1997) noted, "if we do not address the issues, soon we will be going … going … gone" (p. 70). Volk further stated that "the corresponding decrease in doctoral degrees granted and diminished new professional opportunities in technology education teacher preparation programs does not afford the incentive or opportunity for new ideas to be promoted" (p. 69).

Purpose of the Study

The purpose of this research was to identify the factors that influence enrollment in technology teacher education graduate programs, both doctoral and master's levels. This study examined both positive factors, those that influence technology education teachers to enroll in graduate education, and negative factors, barriers that deter teachers from entering either a doctoral or master's degree program. The following research questions were developed for examination:

1. What factors do graduate education program graduates identify as providing the greatest positive influence for their enrollment into a graduate program?
2. What factors do technology education teachers indicate would provide the greatest incentive to enroll in a graduate education program?
3. What factors do graduate education program graduates identify that provided the strongest barriers to their enrollment in a graduate program?
4. What factors do technology education teachers identify as providing the strongest barriers to their enrollment in a graduate education program?

Methodology

This study utilized a modified Delphi technique as noted by Paige, Dugger, and Wolansky (1996) and Wicklien (1993) to identify and analyze what factors led individuals to enter both doctoral programs and master's degree programs focusing on technology teacher education. Additionally, the factors that deter individuals from entering doctoral and master's degree programs were identified.

Population

Two pairs of Delphi panels were established: one pair for examination of the doctoral programs and the other pair of panels to study the master's degree programs. The first doctoral group consisted of recent doctoral graduates (1994 -1999) whose degrees were in technology education focusing on teacher education as indicated in the *Industrial Teacher Education Directory* (Dennis, 1995, 1996; Bell, 1997, 1998, 1999). The directory noted that 127 doctoral degrees were granted during this five-year timeframe. Institutions that had graduated five or more doctorates during the five-year time span were contacted and asked to provide the names and address of their technology education doctoral graduates. This resulted in a population of 15 doctoral graduates whose location could be

identified. These 15 individuals comprised the population for one panel of this modified Delphi study. From this population, nine doctoral graduates agreed to serve on the Delphi panel.

The second doctoral panel consisted of practicing technology education teachers. Technology education directors from six states were asked to identify five technology education teachers who currently hold a master's degree and whom the director would categorize as "an outstanding candidate for doctoral studies." This second doctoral population consisted of 30 technology education teachers having earned a master's degree and identified by their state director as a leader in the profession. From this population, 16 teachers agreed to serve on the Delphi panel.

The first master's degree panel consisted of technology education teachers who had earned a master's degree from 1994 through 1999. This panel was randomly drawn from an identified population of 209 technology education teachers who had earned a master's degree. From this sample, 19 teachers agreed to serve on the Delphi panel. The second master's degree panel consisted of 18 teachers without an advanced degree and who agreed to serve on the Delphi panel. These pre-master's program teachers were selected from a population of technology education teachers identified by state technology education directors.

Procedure

The first round of this modified Delphi study consisted of an open-ended survey mailed to all participants, doctoral graduates, master's degree graduates, and both sets of technology education teachers. Doctoral and master's degree graduates were asked to identify the factors that positively influenced their decision to enter and complete a graduate education program and to list those barriers that they were able to overcome in order to earn an advanced degree. The two non-advance degree panels were asked to list the factors that would positively influence them to enter either a doctoral program or a master's degree program. These two pairs of panels were also asked to identify the barriers that have deterred them from entering either a doctoral program or a master's degree program.

First round responses were then categorized into similar factor groupings for the second round review. Each panel's listings, doctoral graduates, master's degree graduates, and both sets of non-advance degree technology education teachers, were grouped into 10 common factors for both positive influences and barriers. Each Delphi panel was then mailed a set of second round instruments on which the participants were asked to rank-order the 10 factors from 1 (*greatest*) to 10 (*weakest*). Each participant received two ranking surveys, one noting positive influences and the other instrument listing barriers. The findings from the study's second round of responses were then compiled for a third Delphi round. Top rank-ordered items were selected to be used as the factors listed in the study's final round.

During the third and final Delphi round, participants were asked to rate each positive influence and each barrier on a 1 to 5 Likert-type scale (1 = *weak influence*, 3 = *absence of influence*, and 5 = *very strong influence*).

Findings

Master's degree graduates rated their personal goal and desire as the top influence for pursuing a graduate degree (M = 4.74, SD = 0.56; see Table 1), whereas technology education teachers without a master's degree rated their personal goal and desire at a lower level (M = 4.00, SD = 1.14). Doctoral graduates also rated their personal goals and desire as the top positive influence in enrolling and completing a doctoral program in technology education (M = 4.63, SD = 0.70; see Table 2). Technology education teachers from the doctoral Delphi panel who had completed a master's degree also noted that their personal goals and desire would provide them the most positive influence for entering a doctoral program (M = 4.63, SD = 0.78).

The university's geographical location was indicated as a positive influence by both master's degree graduates (M= 4.37, SD = 0.68) and their cohort of technology education teachers (M = 4.28, SD = 1.02). The positive influence of the university's location was also noted by the teachers with a master's degree from the doctoral panel (M = 4.25, SD = 1.09). However, the positive influence of geographical location was

not shared by doctoral graduates (M = 2.38, SD = 1.58). The difference in doctoral panel members with regard to the university's geographical location was also noted in the barriers section by the master's degree Delphi panelists (see Table 3). The pre-master's teachers rated the university's location as a significant barrier to enrolling in a master's degree program when compared to their master's degree graduate counterparts (M = 3.50, SD = 1.58; M = 2.16, SD = 1.30, respectively).

Doctoral graduates rated the doctoral program's quality and reputation along with its faculty's quality and reputation as positive influences (M = 4.00, SD = 0.71; M = 4.00, SD = 0.87). Technology education teachers, from the doctoral panel, rated the quality and reputation of the program and faculty lower (M = 3.63, SD = 0.70; M = 3.56, SD = 1.06). Technology education teachers without a master's degree rated the quality and reputation of the university as their strongest positive influence (M = 4.56, SD = 0.51), whereas the master's degree graduates from this panel rated that item lower (M = 3.84, SD = 1.01).

Both groups from the doctoral Delphi panel indicated that time commitment was a substantial barrier that hindered their enrollment into a doctoral program (M = 4.00, SD = 1.12; M = 4.38, SD = 0.86; see Table 4). Both groups of technology education teachers from the master's degree panel also ranked time commitment as a barrier (M = 3.58, SD = 1.35; M = 3.28, SD = 1.32). Program residency requirements and a lack of quality programs did not appear to provide barriers to either pair of panels.

Table 1. Positive Influences for Enrolling in a Master's Program

	Master's Graduates (n = 19)		Pre-Master's Teachers (n = 18)	
Factor	***M***	***SD***	***M***	***SD***
Personal goal/desire	4.74	0.56	4.00	1.14
University's geographical location	4.37	0.68	4.28	1.02
Pay increase	4.05	1.27	4.22	0.73
Quality and reputation of university	3.84	1.01	4.56	0.51
Financial support/assistantships	2.26	1.59	3.17	1.65

Table 2. Positive Influences for Enrolling in a Doctoral Program

	Doctoral Graduates (n = 9)		Non-Doctoral Teachers (n = 16)	
Factor	***M***	***SD***	***M***	***SD***
Personal goal/desire	4.63	0.70	4.63	0.78
Financial support/assistantships	4.13	0.93	4.44	0.70
Quality and reputation of university	4.00	0.71	3.63	0.70
Quality and reputation of the faculty	4.00	0.87	3.56	1.06
Support of advisor/faculty	4.00	0.87	3.81	0.73
Support of family	4.00	1.22	4.38	0.60
Direct communication with advisor	3.88	1.05	3.81	0.81
Flexibility of the program	3.25	0.97	4.50	0.71
Interest in research	3.13	1.62	3.13	0.99
Credit for prior coursework	2.63	1.58	4.63	0.70
Short residency period	2.38	0.99	4.50	0.71
University's geographic location	2.38	1.58	4.25	1.09
Distance education offerings	1.63	0.99	4.25	1.20

Table 3. Barriers to Enrollment in a Master's Program

Factor	Master's Graduates (n = 19) *M*	*SD*	Pre-Master's Teachers (n = 18) *M*	*SD*
Time commitment	3.58	1.35	3.28	1.32
Financial	3.37	1.26	3.17	1.47
Lack of flexibility in the program	3.11	1.20	3.78	1.00
Lack of quality master's program	2.83	1.15	3.56	1.42
University's geographic location	2.16	1.30	3.50	1.58

Table 4. Barriers to Enrollment in a Doctoral Program

Factor	Doctoral Graduates (n = 9) *M*	*SD*	Non-Doctoral Teachers (n = 16) *M*	*SD*
Time commitment	4.00	1.12	4.38	0.86
Financial	3.75	0.97	3.81	0.88
Family responsibilities	3.50	1.22	4.38	0.70
Lack of flexibility in the program	3.38	1.73	3.44	1.41
Geographic location of university	3.00	1.22	3.88	1.50
Lack of quality doctoral programs	2.88	1.36	3.88	1.96
Program's residency requirement	2.75	1.09	3.69	1.45

Discussion

As with other studies using a modified Delphi technique (Clark & Wenig, 1999; Wicklein, 1993), discrepancies may occur in the gathering of data. During the process of this research, not all participants contributed to all three panels. Some respondents did not participate in the first panel but did participate in either the second or third round. However, their responses were deemed valuable and included in this research.

The purpose of this research was to determine the factors that influence or deter technology education teachers' decisions to enroll in graduate level technology teacher education programs. From the four questions, there were six influencing factors and two barriers that were ranked highest for influencing the decision of technology education teachers to enroll in graduate programs. The participants were in agreement as to the primary influencing factors.

According to the respondents, technology education teachers entering a doctoral program and graduates of both master's and doctoral programs identified their personal goals and desires as the most important factor influencing them to enter or complete a graduate program. Pre-master's technology education teachers viewed their personal goals and desire to be a less important influencing factor. Although the university's geographical location was not rated highly as an influencing factor for doctoral graduates, it was very important for the other three groups. It should be noted that the pre-master's technology education teachers indicated that the quality and reputation of the university was influential in their decision to enter a master's program, whereas the doctoral graduates said the program and faculty quality and reputation were important for entering and completing a doctoral program.

The factor that was determined to be the strongest barrier to the enrollment of both pre-master's and master's technology education teachers in a master's degree program was the university geographical location. The second barrier that was shared by all four groups was the time commitment involved in a graduate program. It was interesting to note that program residency and the lack of quality programs were not determined to be barriers to enrollment, even though the doctoral graduates indicated the

program quality to be an important influencing factor in their decision to enroll.

Other factors influencing enrollment in technology teacher education graduate programs were also noted but were not as significant as those previously discussed. One factor indicated to influence pre-master's technology education teachers to enroll in a master's program was pay increase. Two factors that were determined to influence non-doctoral technology education teachers to enroll in a doctoral program included flexibility of the program and credit for prior course work.

There were several barriers to enrollment that did not have consensus from more than two groups but were significant. The pre-master's technology education teachers indicated that the lack of flexibility and lack of quality in master's programs were barriers to enrollment. Both doctoral panels indicated that family responsibilities and financial commitments were key barriers to their enrollment in a doctoral program.

In summary, it appears that several influencing factors and barriers are shared among several groups. The influencing factors include personal goals and desires and the university's geographical location. The barriers include the university geographical location and time commitment. While some of these factors are difficult to adjust, such as the university's geographic location, other factors such as personal goals and desires, time commitment, and program and faculty quality are flexible.

Recommendations

The information gained from this research is provided as a foundation for future research and program development. Through periodic evaluation of influencing factors and barriers to technology education teacher enrollment in graduate programs, the technology education field can make the necessary changes to improve program quality and increase enrollment.

Based on the information from this research, we recommend the following to graduate program coordinators:

1. Promote the quality of the university, the program, and its faculty. This can be performed by integrating the *Standards for Technological Literacy: Content for the Study of Technology* (International Technology Education Association, 2000) into the program and encouraging faculty to become active in local, state, and national technology education organizations and conferences. Include information about the quality of the program in brochures and advertisements.
2. Capitalize on the technology education teacher's personal goals and desires to recruit qualified individuals into graduate education programs. When recruiting or interviewing, discuss the goals and desires of the teacher and indicate how your technology education graduate program can help the teacher fulfill those goals and desires.
3. Promote the location of the university and the cultural aspects of the community. Let the technology education teacher know that the program and university are in a great location for families, schools, spouse employment, etc.
4. Inform technology education teachers that time commitment is a requirement of graduate education and that there will be benefits to obtaining a graduate degree.

The following are recommendations for further study:

1. Periodic studies should be conducted to determine consistencies and changes to the influences and barriers indicated by technology education teachers regarding their enrollment in technology education graduate programs.
2. Research should be conducted to determine the factors that make a successful technology teacher education graduate program.

As noted by Paige et al. (1996),

> doctoral-granting institutions must provide the leadership. This leadership must come in the form of providing programs that have a research focus directed toward contributing to the body of knowledge and

> that are aimed at developing and providing future leaders with the background and experiences that are needed to move the profession forward into the 21st century. (p. 20)

If the universities do not increase their production of advanced degrees in technology education focusing on teacher education, Volk's (1997) doomsday prediction will be reality.

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